

REMARKS

Applicant has amended claims 1, 8 and 16 to more precisely define the invention. Claim 12 has been amended to correct clerical errors. Claims 19-24 have been added to provide additional claim coverage for the invention. Applicant has amended the specification as requested by the Examiner.

Upon entry of the amendments, claims 1-24 are pending for consideration by the Examiner.

As a predicate to reconsideration of the claims, it is very apparent that there are technical subtleties with respect to the disclosed and claimed invention and with respect to the alleged prior art, which may not be readily appreciated. Applicant's invention and the art as cited by the Examiner are from wholly different eras with respect to adhesion technology and are also from wholly different technological fields. In this regard, it should be appreciated that many of the terms and descriptions employed in the cited art and Applicant's claimed invention have significantly different meanings and context.

A fundamental understanding of Applicant's invention derives from the field of technology wherein Applicant is joining light gauge metal members within the context of the construction trades by a novel use of adhesives which has not been heretofore achieved, and in fact, was contrary to the prevailing technology at the time of the invention. In Applicant's invention, once the joining process is completed, the principal portion of the joint load bearing capacity (as contrasted to the cited art) is provided by the adhesive, and the mechanical fasteners, as

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documented in the specification, essentially disappear as load bearing members when subjected to intense loads.

By contrast, the art as represented in Orowan U.S. Patent No. 3,655,424 and the content of the Orowan '424 teaching cited by the Examiner, is a wholly different type of connection as typified by column 1, line 27 et seq., which describes the context of the Orowan invention and wherein it is stated:

"the use of the adhesive in this fashion contributes to relieve the load on the rivets to a relatively small extent and gives some protection against fretting at the rivet holes, since the adhesive has a very low shear modulus compared to the metals usually joined in this manner and, therefore, cannot immobilize the joints sufficiently to prevent rubbing at the rivet holes. The relative motion of the joined parts can be reduced by making the adhesive layer very thin; in this case, however, the advantage of distributing the load over the bonded surface by means of the highly elastic adhesive layer is lost and the adhesive joint becomes weak relative to its surface area."

It is further stated at col. 1, lines 54 et seq., that an object of the Orowan '424 patent is:

"to provide an adhesive tape particularly adapted for use in connection with rivets, pins, bolts or similar fastening devices for reducing the displacements that the joint would suffer in the absence of the adhesive and thereby relieve the fastening devices of a greater part of the load to which they would otherwise be exposed without the adhesive or with conventional adhesives of approximate constant thickness."

This is neither the object nor the context, nor the result of Applicant's invention, because Applicant's invention produces a wholly different system and assembly, wherein the essence of the load bearing connection is provided by the adhesive system and not the mechanical fasteners. This is reflected in the claim

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8 feature so that members are joined in a connection which is significantly enhanced in load bearing capacity to the connection provided only by the at least one fastener. The remaining independent claims 1, 16, 19 and 22 recite analogous features in relation to joined elements. Applicant has further documented this novel load-bearing feature in the specification as well as schematically and quantitatively illustrated same in the figures of the application. The significantly enhanced load-bearing feature provided by Applicant's fastening system is documented by the hysteresis curves of Figures 4-7. When the Orowan '424 reference is properly considered as a whole, a fair inference is that the Orowan fasteners provide a very significant load-bearing factor to the joint assembly.

Applicant's invention employs the mechanical fasteners to provide a fastening function while the adhesive is curing between the joint members as well as to provide an auxiliary mechanical lock if the joined system should ever be subjected to fire or intense heat which would potentially compromise the integrity of the adhesive bond in a structure which may typically be used for buildings and the like.

Moreover, it is highly significant and it is explicitly noted that the Orowan '424 reference represents an approach that was originally tried by Applicant, but was rejected because it could not provide the requisite load bearing characteristics. The Orowan '424 reference is clearly concerned with an adhesive tape or adhesive film type adhesion system which Applicant originally



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considered, but after due testing, rejected the approach since it did not provide sufficient adhesive load bearing capacity.

It will be appreciated that all of the pending claims of the application incorporate the feature wherein the members (of panel or structure or frame) are joined in a connection which is significantly enhanced in load bearing capacity to a connection provided by fasteners alone.

In addition, claims 4-6, 11-15, 18, 21 and 24 are also patentable for the additional reasons that none of the references cited by the Examiner disclose the use of an epoxy to make the metal connections as recited in such claims.

For the foregoing reasons, it is respectfully submitted that all claims in the application as amended are in condition for allowance. Accordingly, favorable reconsideration by the Examiner is respectfully solicited.

Respectfully Submitted,

Alex S. Toback

By: 

Guy D. Yale
Registration No. 29,125
Alix, Yale & Ristas, LLP
Attorney for Applicant

Date: September 5, 2002
750 Main Street, Suite 1400
Hartford, CT 06103-2721
(860) 527-9211
Our Ref: TOB/102/US

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**CLEAN COPY OF AMENDED PARAGRAPH
OF THE SPECIFICATION**

A In one embodiment of the invention, the adhesive 10 fully cures at room temperature within 72 hours. One acceptable adhesive employed in the invention is an adhesive sold as Formulation No. 12059A marketed by the Advanced Adhesive Systems, Inc., of Newington, Connecticut. The adhesive is a two part epoxy system having a substantially 1:1 resin/hardener mix by weight or volume which has a very high viscosity and cures at room temperature. This formulation upon curing has a Shore D of 40-45 and an operating temperature range of -40° F to 250° F. The adhesive 10 may also be another room temperature or heat activated adhesion system such as methacrylate, urethane, etc.

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1. A connection system for connecting at least one light gauge steel panel to a support structure comprising:

applying an adhesive to at least one of said panel or support structure, said adhesive being curable at room temperature and able to adhere to steel;

placing said panel against said support structure;

driving at least one fastener through the panel into said support structure;

and

A2 allowing said adhesive to cure,

so that said panel is joined to said structure in a connection which is significantly enhanced in load bearing capacity to a connection provided only by the at least one fastener.

A3 8. A connection system for connecting at least one light gauge steel member to a second member comprising:

applying a bead of epoxy to at least one of said members, said epoxy being curable at room temperature and able to adhere to steel;

positioning said members in adjacent relationship with said epoxy disposed between said members;

driving at least one fastener through one member into said other member;

and

allowing said epoxy to cure,

so that said members are joined in a connection which is significantly enhanced in load bearing capacity to a connection provided only by the at least one fastener.

A3

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A4

12. The connection system of claim 8 wherein said epoxy comprises a resin and hardener which are mixed in substantially equal portions by volume.

16. A connection system for connecting at least one light gauge steel panel to a steel frame comprising:

applying a bead of adhesive to at least one of said panel or frame, said adhesive being curable at room temperature and able to adhere to steel;

positioning said panel against said frame with said adhesive disposed between said panel and frame;

driving at least one fastener through said panel into said frame; and
allowing said adhesive to cure,

so that said panel is joined to said frame in a connection which is significantly enhanced in load bearing capacity to a connection provided only by the at least one fastener.

A5

19. An assembly comprising:

A6 a support structure;

a panel of light gauge steel mounted to said support structure;

a structural adhesive curable at room temperature and disposed between said support structure and said panel;

at least one fastener driven through said panel into said support structure,

so that said panel is joined to said structure in a connection which is significantly enhanced in load bearing capacity in relation to a connection provided only by the at least one fastener.

20. The assembly of claim 19, wherein each said fastener is selected from the group consisting of self drilling screws, rivets, pins and clinches.

21. The assembly of claim 19, wherein said adhesive is a two part epoxy system.

22. An assembly comprising:

a metal support frame;

a panel of light gauge steel mounted to said support frame;

a structural adhesive curable at room temperature disposed between said support frame and said panel;

a plurality of fasteners driven through said panel into said support frame,

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so that said panel is joined to said support structure in a connection which is significantly enhanced in load bearing capacity in relation to a connection provided only by the at least one fastener.

23. The assembly of claim 22, wherein the fasteners are selected from the group consisting of self-drilling screws, rivets, pins and clinches.

24. The assembly of claim 22, wherein said adhesive is a two part epoxy system.

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